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Enclosed for filing is the patent application of Inventor(s):

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For: METHOD AND APPARATUS FOR TUNING CONTENT OF INFORMATION  
PRESENTED TO AN AUDIENCE

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**ENCLOSED ARE:**

- ☒ Associate Power of Attorney;
- ☒ Information Disclosure Statement, Form PTO-1449 and copies of documents listed therein;
- ☐ Preliminary Amendment;
- ☒ Specification (25 Pages of Specification, Claims, & Abstract);
- ☒ Declaration and Power of Attorney:  
(2 Pages of a ☒ fully executed ☐ unsigned Declaration);
- ☒ Drawing (9 sheets of ☐ informal ☒ formal sheets);
- ☐ Certified copy of application Serial No. ;
- ☒ Other: Authorization Pursuant to 37 CFR 1.136
- ☒ Assignment to PHILIPS ELECTRONICS NORTH AMERICA CORPORATION

**FEE COMPUTATION**

CLAIMS AS FILED				
FOR	NUMBER FILED	NUMBER EXTRA	RATE	BASIC FEE - 690.00
Total Claims	35- 20 =	15	X \$18 =	270.00
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Multiple Dependent Claims, if any			\$260 =	0.00
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☐ Amend the specification by inserting before the first line the sentence: --This is a continuation-in-part of application Serial No. , filed .--.

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METHOD AND APPARATUS FOR TUNING CONTENT OF INFORMATION  
PRESENTED TO AN AUDIENCE

5    Field of the Invention

          The present invention relates to a method and apparatus  
for presenting information to an audience, and more particularly,  
to a method and apparatus for tuning the content of information  
that is presented, for example, on a large display screen or an  
10 information kiosk, to an audience.

Background of the Invention

          The impact of advertising and other presented  
information can be significantly increased if the content can be  
adapted to a given target audience. The success of any  
advertising campaign, for example, requires that the  
advertisements reach the target audience. Generally, a  
particular advertising or informative message is targeted for one  
or more segments of a population, with media planners determining  
the best way to reach the target audience.  
20

          Typically, prior to executing an advertising campaign,  
media planners attempt to predict the best media options to reach  
a target audience. In addition, during a given advertising  
campaign, it is helpful to measure the exposure of the target  
audience to the advertising messages, since media planners might  
make corrections in order to optimize the implementation of the  
media plan. Likewise, after a given advertising campaign, media  
planners often analyze the advertising campaign to confirm that  
the advertising messages reached the target audience.  
25

          While the audience demographics associated with most  
media vehicles are well defined, the dynamic nature of some media  
vehicles makes predicting the audience demographics in advance  
difficult, if not impossible. For example, large screen  
displays, such as information kiosks, are often utilized in  
public places to present advertisements and other information to  
35

people passing by the displays. Typically, the content that is presented to the public on such a display is generally suitable for the location where the display is installed. For example, airports and other transportation terminals often use such displays to present schedules and other information of interest to passengers.

Thus, tailoring the content to such a dynamic audience is difficult. While such displays and information kiosks have been effective for presenting general information to large audiences, they suffer from a number of limitations, which if overcome, could greatly expand their utility and effectiveness. Specifically, since the demographics of the audience in such public places cannot be accurately predicted in advance, any presented content must generally appeal to the population at large.

A need therefore exists for a method and apparatus for automatically evaluating the demographics of an audience in real-time and for tuning the content of information that is presented on a large display screen or an information kiosk to the current audience. A further need exists for a method and apparatus for evaluating the reaction of an audience to presented content in real-time. Yet another need exists for a method and apparatus for estimating the size of an audience in real-time. Finally, a need exists for a method and apparatus for generating reports on the exposure of various population segments to presented content. In this manner, the reports provide a feedback mechanism that allows the content providers and advertisers to reach the target audience in an efficient manner.

## Summary of the Invention

Generally, a method and apparatus are disclosed for tuning the content of information presented, for example, on a large display screen or an information kiosk, to an audience. A

disclosed content selection and driving system (i) extracts relevant characteristics about the audience, (ii) analyzes the characteristics, (iii) modifies the presented content based on the analysis, and (iv) records relevant statistics for reporting.

5. The content selection and driving system evaluates the impact of advertising or information displayed on the display. An audio/visual analyzer derives audience characteristics and other information on the public reaction to the presented advertising or information by analyzing audio or video information, or both. In one illustrative embodiment, the audio/visual analyzer can derive (i) various demographic statistics, including gender, race or age statistics; (ii) the current size of the audience; (iii) how quickly the audience is changing; and (iv) how much attention the audience is paying to the presented advertising or information.

The derived characteristics are utilized by a dynamic content selector to tune the content of the presented advertising or information to the characteristics of the current audience. The dynamic content selector utilizes the derived audience statistics, and optionally offline statistics about the local environment, to select the appropriate content for the current audience from a content database.

A reporting module is disclosed that receives the real-time audience statistics from the audio/visual analyzer and an indication of the selected content from the dynamic content selector. Reports can be generated for the content provider, such as advertisers, that indicate the exposure of various population segments to the presented content and the reaction of the audience to the presented content, thereby providing a feedback mechanism that allows the content providers and advertisers to effectively reach the target audience.

A more complete understanding of the present invention, as well as further features and advantages of the present

invention, will be obtained by reference to the following detailed description and drawings.

#### Brief Description of the Drawings

5- FIG. 1 illustrates a content selection and driving system in accordance with the present invention;

FIG. 2 is a schematic block diagram of the audio/visual analyzer of FIG. 1;

10 FIG. 3 is a schematic block diagram of the dynamic content selector of FIG. 1;

FIG. 4 is a sample table illustrating an exemplary content database of FIG. 1;

15 FIG. 5 is a flow chart describing an exemplary audience demographic analysis process employed by the audio/visual analyzer of FIG. 2 and embodying principles of the present invention;

FIG. 6 is a flow chart describing an exemplary audience count process employed by the audio/visual analyzer of FIG. 2 and embodying principles of the present invention;

20 FIG. 7 is a flow chart describing an exemplary audience turn-over evaluation process employed by the audio/visual analyzer of FIG. 2 and embodying principles of the present invention;

25 FIG. 8 is a flow chart describing an exemplary audience attention evaluation process employed by the audio/visual analyzer of FIG. 2 and embodying principles of the present invention;

30 FIG. 9 is a flow chart describing an exemplary content selection and driving process employed by the dynamic content selector of FIG. 3 and embodying principles of the present invention; and

FIG. 10 illustrates an exemplary report generated in accordance with the present invention indicating the exposure of

various population segments to the presented content and the reaction of the audience to the presented content.

### Detailed Description

5. FIG. 1 illustrates a content selection and driving system 100 in accordance with the present invention. Generally, the content selection and driving system 100 (i) extracts relevant characteristics about the audience, (ii) analyzes the characteristics, (iii) modifies the presented content based on the analysis, and (iv) records relevant statistics for reporting.

10 As shown in FIG. 1, one or more audio/visual capture devices 120-1 through 120-N (hereinafter, collectively referred to as audio/visual capture devices 120) are focused on an audience 130 that is viewing a display 110, such as a large screen display or an information kiosk. In one embodiment, the display 110 may be embodied as the Access Point™ information kiosk, commercially available from Philips Electronics, N.A. Typically, the display 110 may be installed in a public place, such as an airport, transportation terminal, shopping mall, museum or the like. The audio/visual capture devices 120 may include, for example, a pan-tilt-zoom (PTZ) camera for capturing video information or an array of microphones for capturing audio information, or both.

25 It is noted that the composition of the audience 130 may vary over time, depending, at least in part, on the nature of the location where the display 110 is installed. One feature of the present invention, discussed below in conjunction with FIG. 7, evaluates the rate of change of the audience 130. In this manner, if the audience is not changing quickly, the content selection and driving system 100 can select longer advertising messages or programs, or more detailed information. If the audience is moving and changing more quickly over time, shorter

advertising messages or programs, or less detailed information, can be presented.

The content selection and driving system 100 evaluates the impact of advertising or information displayed on the display 110. As shown in FIG. 1, the content selection and driving system 100 includes an audio/visual analyzer 200, discussed below in conjunction with FIG. 2, that derives audience characteristics and other information on the public reaction to the presented advertising or information by analyzing audio or video information, or both. As discussed further below in conjunction with FIGS. 5 through 8, the audio/visual analyzer 200 can extract various types of information about the audience from the audio or video information, or both. In the illustrative embodiment, the audio/visual analyzer 200 can derive (i) various demographic statistics, including gender, race or age statistics; (ii) the current size of the audience; (iii) how quickly the audience is changing; and (iv) how much attention the audience is paying to the presented advertising or information.

The derived characteristics could be utilized by a dynamic content selector 300, discussed below in conjunction with FIG. 3, to tune the content of the presented advertising or information to the characteristics of the current audience. For example, the content selection and driving system 100 may store two versions of an advertisement for a given product, with one version targeting men and the second version targeting women. The content selection and driving system 100 can dynamically select one version over the other based on a dynamic determination of the current gender composition of the audience 130. As shown generally in FIG. 1, and discussed further below, the dynamic content selector 300 utilizes the derived audience statistics and offline statistics about the local environment, such as historical audience demographics, or flight or train

schedules, to select the appropriate content for the current audience from a content database 400.

In addition, the content selection and driving system 100 includes a reporting module 150 that receives the real-time audience statistics from the audio/visual analyzer 200 and an indication of the selected content from the dynamic content selector 300. The reporting module 150 includes a report generator 160 that produces reports, discussed further below in conjunction with FIG. 10, for the content provider, such as advertisers. Generally, the reports indicate the exposure of various population segments to the presented content and the reaction of the audience to the presented content, thereby providing a feedback mechanism that allows the content providers and advertisers to effectively reach the target audience. For example, the reports produced by the report module 150 can indicate the size and rate of change of the audience, as well as various demographics of the audience, such as age, race, or gender. As discussed further below in conjunction with FIG. 2, these audience statistics are generated by the audio/visual analyzer 200.

FIG. 2 is a block diagram showing the architecture of an illustrative audio/visual analyzer 200 in accordance with the present invention. The audio/visual analyzer 200 may be embodied as a general purpose computing system, such as the general purpose computing system shown in FIG. 2. As shown in FIG. 2, the audio/visual analyzer 200 preferably includes a processor 210 and related memory, such as a data storage device 220, which may be distributed or local. The processor 210 may be embodied as a single processor, or a number of local or distributed processors operating in parallel. The data storage device 220 and/or a read only memory (ROM) (not shown) are operable to store one or more instructions, which the processor 210 is operable to retrieve, interpret and execute. The audio/visual analyzer 200 receives



audio or video signals, or both, from the audio/visual capture devices 120. The audience characteristics derived by the audio/visual analyzer 200 from the audio/video information is presented to the dynamic content selector 300 for further processing.

As discussed further below in conjunction with FIGS. 5 through 8, the data storage device 220 includes an audience demographic analysis process 500, an audience count process 600, an audience turn-over evaluation process 700 and an audience attention evaluation process 800. Generally, the audience demographic analysis process 500 evaluates facial and body features of the audience to segment the audience based on one or more desired demographics, such as age, race, or gender. The audience count process 600 analyzes the video image to identify distinctive human features, such as a body, head and facial feature hierarchy, and then counts the individuals in the image to estimate the size of the audience. The audience turn-over evaluation process 700 generates an evaluation of how quickly the audience is changing. The audience attention evaluation process 800 evaluates the audio or video information, or both, to identify behavior that suggests whether or not the audience is paying attention to the presented advertising or information, such as reading a newspaper, playing games, speaking, or facing the display.

FIG. 3 is a block diagram showing the architecture of an illustrative dynamic content selector 300 in accordance with the present invention. The dynamic content selector 300 may be embodied as a general purpose computing system, such as the general purpose computing system shown in FIG. 3. The dynamic content selector 300 includes certain standard hardware, such as processor 310 and related memory, such as a data storage device 320, as discussed above in conjunction with the audio/visual analyzer 200 (FIG. 2). It is noted that the audio/visual

analyzer 200 and dynamic content selector 300 may optionally be integrated using a single general purpose computing system.

As shown in FIG. 3, the data storage device 320 includes an offline statistics database 340, a content selection and driving process 900 and a dynamic content evaluator process 1000. Generally, the offline statistics database 340 contains information relevant to the local environment where the display 110 is installed. For example, the offline statistics database 340 may include historical demographic information on the audience 130 for this location. Thus, the content can be selected on the basis of such historical information in the absence of instantaneous information. In a further variation, the offline statistics database 340 can contain flight, bus or train schedule information if the display 110 is installed in a transportation terminal. In this manner, the dynamic content selection can be supplemented using the likely destination of the passengers.

As discussed further below in conjunction with FIG. 9, the content selection and driving process 900 selects advertising or other information to present to the audience 130 based on the current characteristics of the audience or off-line information or both.

FIG. 4 illustrates an exemplary content database 400 that stores information on the advertisements and other information that can be presented to the audience 130. The content database 400 maintains a plurality of records, such as records 405 through 420, each associated with a different content selection. For each content identifier listed in field 430, the content database 400 includes a brief description in field 440, and indicates the corresponding target audience and length in fields 450 and 460, respectively. In this manner, the content selection and driving process 900 can select content appropriate

for the current audience based on the information contained in fields 450 or 460 of the content database 400.

#### PROCESSES

As previously indicated, the audio/visual analyzer 200  
5. executes an audience demographic analysis process 500, shown in FIG. 5, to evaluate to segment the audience based on one or more desired demographics, such as age, race, or gender. As shown in FIG. 5, the audience demographic analysis process 500 receives one or more video images and identifies facial features during  
10 step 510. Thereafter, during step 520, the audience demographic analysis process 500 analyzes the facial features or height of the individuals in the image to segment the audience based on one or more desired demographics, such as age, race or gender.

The audience may be segmented on the basis of age using the techniques taught, for example, in United States Patent Number 5,781,650, issued to Lobo et al., incorporated by reference herein. Furthermore, an average distribution of age may be obtained by evaluating height information, in the manner described in Antonio Criminisi et al., "A New Approach to Obtain Height Measurements from Video," Proc. of SPIE, Boston, MA, Vol. 3576 (November 1-6, 1998), incorporated by reference herein. The audience may be segmented on the basis of race using the skin-tone techniques taught, for example, in Face Guardian: Real-Time Face Verification Software that Recognizes Who You Are,  
25 [http://www.keywareusa.com/300\\_products/face\\_fs.html](http://www.keywareusa.com/300_products/face_fs.html), incorporated by reference herein. The audience may be segmented on the basis of gender using the techniques taught, for example, in Baback Moghaddam and Ming-Hsuan Yang, "Gender Classification with Support Vector Machines," Proc. of the fourth IEEE  
30 International Conference on Automatic Face and Gesture Recognition, 306-11, Grenoble, France (March, 2000), incorporated by reference herein. It is noted that gender and age information can also be derived from the height information.

Finally, the audience demographic analysis process 500 generates a profile of the current audience during step 530 before program control terminates.

As previously indicated, the audio/visual analyzer 200  
5. executes an audience count process 600, shown in FIG. 6, to analyze the video image to identify distinctive human features, such as a body, head and facial feature hierarchy, and then count the individuals (e.g., heads) in the image to estimate the size of the audience. As shown in FIG. 6, the audience count process  
10 600 initially receives one or more video images and identifies human bodies, heads, and/or facial features during step 610.

Thereafter, during step 620, the audience count process 600 counts, for example, the heads in the image(s). The body/head count may be performed using the techniques taught, for example, in Patent WO9932959, entitled "Method and System for Gesture Based Option Selection, assigned to the assignee of the present invention, Damian Lyons and Daniel Pelletier, "A Line-Scan Computer Vision Algorithm for Identifying Human Body Features," Gesture'99, 85-96 France (1999), Ming-Hsuan Yang and Narendra Ahuja, "Detecting Human Faces in Color Images," Proc. of the 1998 IEEE Int'l Conf. on Image Processing (ICIP 98), Vol. 1, 127-130, (October, 1998); and I. Haritaoglu, D. Harwood, L. Davis, "Hydra: Multiple People Detection and Tracking Using Silhouettes," Computer Vision and Pattern Recognition, Second  
20 Workshop of Video Surveillance (CVPR, 1999), each incorporated by reference herein. Finally, the audience count process 600 approximates the size of the audience 130 during step 630, before program control terminates.

As previously indicated, the audio/visual analyzer 200  
30 executes an audience turn-over evaluation process 700, shown in FIG. 7, to generate an evaluation of how quickly the audience is changing. The audience turn-over evaluation process 700 initially executes a flow rate routine to analyze the video

information and determine the number of individuals passing before the display 110 in a given time interval. The flow rate routine may be performed using the body/head count techniques taught in the references identified in the previous paragraph to

5. track heads and compute how many people pass the display over time.

Thereafter, the audience turn-over evaluation process 700 generates an evaluation of the turn-over rate of the audience 130, for example, in terms of number of individuals passing the

10 display

As previously indicated, the audio/visual analyzer 200 executes an audience attention evaluation process 800, shown in FIG. 8, to evaluate the audio or video information, or both, to identify behavior that suggests whether or not the audience is paying attention to the presented advertising or information, such as reading a newspaper, playing games, speaking, or facing the display.

As shown in FIG. 8, the audience attention evaluation process 800 initially performs a test during step 810 to determine if the audience is generally static, based, for example, on the evaluation of the turn-over rate of the audience 130 generated by the audience turn-over evaluation process 700. If it is determined during step 810 that the audience is not generally static, then program control returns to step 810 until

25 the audience is generally static. Thus, the present invention assumes that if the turn-over rate of the audience exceeds a predefined threshold that the audience is not paying sufficient attention to warrant further evaluation.

If, however, it is determined during step 810 that the

30 audience is generally static, then the audience attention evaluation process 800 evaluates the audio or video information (or both) during step 820 to identify. For example, if a person is reading a newspaper, playing a game, speaking, or not facing

the display, the person is generally not likely to be paying attention to the presented content.

Thus, the present invention identifies specific behavior that is used to infer whether or not the audience is paying attention to the presented content. For example, the following behavior suggests whether an individual is likely paying attention to the content: facing the display, changing body pose to face the display, changing body expressions (visual, tracking of body features), changing facial expression as the message is displayed (visual), suddenly becoming silent (audio level down), or starting to laugh/concentrate because of the content (audio change).

The audience attention evaluation process 800 can identify facial expressions (such as recognizing a change in facial expression) using the techniques described, for example, in J.F. Cohn and G.S. Katz, "Bimodal Expression of Emotion by Face and Voice," Workshop on Face/Gesture Recognition and Their Applications, 6<sup>th</sup> ACM International Multimedia Conference (Sept., 1998), incorporated by reference herein. The audience attention evaluation process 800 can identify Hallucinating Faces, using the techniques described, for example, in S. Baker and T. Kanade, "Hallucinating Faces," 4<sup>th</sup> Int'l Conf. on Automatic Face and Gesture Recognition (March, 2000), incorporated by reference herein. The audience attention evaluation process 800 can identify embedded faces and facial expressions using the techniques described, for example, in Antonio Colmenarez et al, "Embedded Face and Facial Expression Recognition," Int'l Conf. on Image Processing, Kobe, Japan (1999), incorporated by reference herein.

The audience attention evaluation process 800 can identify Body posture/pose using the techniques described, for example, in D. Anderson, "Occupational Biometrics" John Wiley and Son (2d Edition, 1991), and S. Iwasawa et al., "Real-time, 3D

Estimation of Human Body Postures from Trinocular Images," ICCV'99, Workshop on Modeling People, Corfu, Greece (1999), each incorporated by reference herein. The audience attention evaluation process 800 can identify body features (such as head, hands or feet) to detect a change in the body expression using the techniques described, for example, in Damian Lyons and Daniel Pelletier, "A Line-Scan Computer Vision Algorithm for Identifying Human Body Features," Gesture'99 France (1999), incorporated by reference herein.

Finally, the audience attention evaluation process 800 generates an evaluation of the audience attention during step 830 before program control terminates.

As previously indicated, the dynamic content selector 300 executes a content selection and driving process 900, shown in FIG. 9, to select advertising or other information to present to the audience 130 based on the current characteristics of the audience. The content selection and driving process 900 is merely presented to illustrate a rule-based implementation for exemplary rules. In practice, each rule could be adapted for a given application, as would be apparent to a person of ordinary skill in the art.

As shown in FIG. 9, the content selection and driving process 900 initially receives audience statistics from the audio/visual analyzer 200 during step 910. The content selection and driving process 900 then performs a test during step 920 to determine if the statistics suggest that the current audience is primarily composed of a given segment (or demographic). If it is determined during step 920 that the current audience is primarily composed of a given segment (or demographic), then content appropriate for the identified segment is selected during step 930 based on the target audience field 450 in the content database 400. If, however, it is determined during step 920 that the current audience is not primarily composed of a given segment

(or demographic), then a further test is performed during step 940 to determine if the turn-over rate suggests that the audience composition is changing slowly.

If it is determined during step 940 that the turn-over rate suggests that the audience composition is changing slowly, then content having a longer duration, as indicated in field 460 of the content database 400 is selected during step 950. If, however, it is determined during step 940 that the turn-over rate does not suggest that the audience composition is changing slowly, then general content having an average duration is selected during step 960 from the content database 400. Thereafter, program control terminates. As previously indicated, according to one feature of the present invention, the reporting module 150 receives real-time audience statistics from the audio/visual analyzer 200 and an indication of the selected content from the dynamic content selector 300. The reporting module 150 produces reports indicating the exposure of various population segments to the presented content and the reaction of the audience to the presented content, thereby providing a feedback mechanism that allows the content providers and advertisers to effectively reach the target audience.

Generally, the generated reports can be customized to the needs of a given content provider and can include any statistics produced by the audio/visual analyzer 200 using the audience demographic analysis process 500, audience count process 600, audience turn-over evaluation process 700 and audience attention evaluation process 800, discussed above in conjunction with FIGS. 5 through 8, respectively.

FIG. 10 illustrates an exemplary report 1000 generated in accordance with the present invention indicating the exposure of various population segments to the presented content and the reaction of the audience to the presented content. The illustrative report 1000 includes a plurality of rows, such as





## Claims

What is claimed is:

5. 1. A method for presenting information to an audience,  
said method comprising the steps of:  
processing at least one of an audio and video signal  
generated by an audio/visual capture device focused on said  
audience to extract relevant characteristics about said audience;  
10 analyzing said extracted characteristics; and  
modifying said presented information based on said  
analysis.
2. The method of claim 1, wherein said extracted  
characteristics include one or more demographic statistics.
3. The method of claim 1, wherein said extracted  
characteristics include the current size of the audience.
- 20 4. The method of claim 1, wherein said extracted  
characteristics evaluate how quickly said audience is changing  
over time.
5. The method of claim 1, wherein said extracted  
25 characteristics evaluate the degree of attention the audience is  
paying to said presented information.
6. A method for presenting information to an audience,  
said method comprising the steps of:  
30 processing at least one of an audio and video signal  
generated by an audio/visual capture device focused on said  
audience to extract demographic statistics about said audience;  
and



13. The method of claim 10, wherein information of a longer duration is selected if a rate of change of said audience is above a predefined threshold.

5. 14. A method for presenting information to an audience, said method comprising the steps of:

processing at least one of an audio and video signal generated by an audio/visual capture device focused on said audience to evaluate a degree of attention said audience is paying to said presented information; and

adjusting a current selection of said presented information if said degree of attention meets predefined criteria.

15. The method of claim 14, wherein said degree of attention is inferred on the basis of at least one of whether an individual is facing the display, changing body pose to face the display, changing body expressions, changing facial expression as the message is displayed, suddenly becoming silent, and starting to laugh/concentrate because of the content.

16. A method for evaluating information presented to an audience, said method comprising the steps of:

processing at least one of an audio and video signal generated by an audio/visual capture device focused on said audience to extract demographic statistics about said audience; and

generating a report indicating said demographic statistics of said audience.

17. The method of claim 16, wherein said demographic statistics indicate a size of said audience.



25. The method of claim 21, wherein said extracted relevant characteristics indicate an attention level of said audience for at least one demographic segment.
5. 26. A method for evaluating information presented to an audience, said method comprising the steps of:
- processing at least one of an audio and video signal generated by an audio/visual capture device focused on said audience to evaluate a degree of attention said audience is paying to said presented information; and
  - generating a report evaluating said degree of attention said audience is paying to said presented information.
27. The method of claim 26, further comprising the step of deriving a rate of change of said audience for at least one demographic segment.
28. The method of claim 26, wherein said extracted relevant characteristics indicate an attention level of said audience based on at least one demographic segment.
29. A system for presenting information to an audience, comprising:
- an audio/visual capture device focused on said audience;
  - a memory for storing computer readable code; and
  - a processor operatively coupled to said memory, said processor configured to:
    - process at least one of an audio and video signal generated by said audio/visual capture device to extract relevant characteristics about said audience;
    - analyze said extracted characteristics; and

modify said presented information based on said analysis.

30. A system for presenting information to an audience, comprising:  
an audio/visual capture device focused on said audience;  
a memory for storing computer readable code; and  
a processor operatively coupled to said memory, said processor configured to:  
process at least one of an audio and video signal generated by said audio/visual capture device to extract demographic statistics about said audience; and  
select said presented information based on said demographic statistics.

31. A system for presenting information to an audience, comprising:  
an audio/visual capture device focused on said audience;  
a memory for storing computer readable code; and  
a processor operatively coupled to said memory, said processor configured to:  
process at least one of an audio and video signal generated by said audio/visual capture device to determine how quickly said audience is changing over time; and  
select said presented information based on said determination of how quickly said audience is changing.

32. A system for presenting information to an audience, comprising:  
an audio/visual capture device focused on said audience;

a memory for storing computer readable code; and  
a processor operatively coupled to said memory, said  
processor configured to:

process at least one of an audio and video signal  
5. generated by said audio/visual capture device to evaluate a  
degree of attention said audience is paying to said presented  
information; and

adjust a current selection of said presented  
information if said degree of attention meets predefined  
10 criteria.

33. A system for evaluating information presented to  
an audience, comprising:

an audio/visual capture device focused on said  
15 audience;

a memory for storing computer readable code; and

a processor operatively coupled to said memory, said  
processor configured to:

process at least one of an audio and video signal  
20 generated by said audio/visual capture device to extract  
demographic statistics about said audience; and

generate a report indicating said demographic  
statistics of said audience.

25 34. A system for evaluating information presented to  
an audience, comprising:

an audio/visual capture device focused on said  
audience;

a memory for storing computer readable code; and

30 a processor operatively coupled to said memory, said  
processor configured to:



process at least one of an audio and video signal generated by said audio/visual capture device to extract relevant characteristics about said audience; and

generate a report indicating said extracted relevant characteristics about said audience.

35. A system for evaluating information presented to an audience, comprising:

an audio/visual capture device focused on said audience;

a memory for storing computer readable code; and

a processor operatively coupled to said memory, said processor configured to:

process at least one of an audio and video signal generated by said audio/visual capture device to evaluate a degree of attention said audience is paying to said presented information; and

generate a report evaluating said degree of attention said audience is paying to said presented information.

## ABSTRACT

A method and apparatus are disclosed for tuning the content of information presented to an audience, for example, on a large display screen or an information kiosk. A disclosed content selection and driving system (i) extracts relevant characteristics about the audience, (ii) analyzes the characteristics, (iii) modifies the presented content based on the analysis, and (iv) records relevant statistics for reporting.

An audio/visual analyzer derives audience characteristics and other information on the public reaction to the presented advertising or information by analyzing audio or video information, or both. The derived characteristics are utilized to tune the content of the presented advertising or information to the characteristics of the current audience. A reporting module receives real-time audience statistics and an indication of the selected content. Reports can be generated for the content provider, such as advertisers, that indicate the exposure of various population segments to the presented content and the reaction of the audience to the presented content.

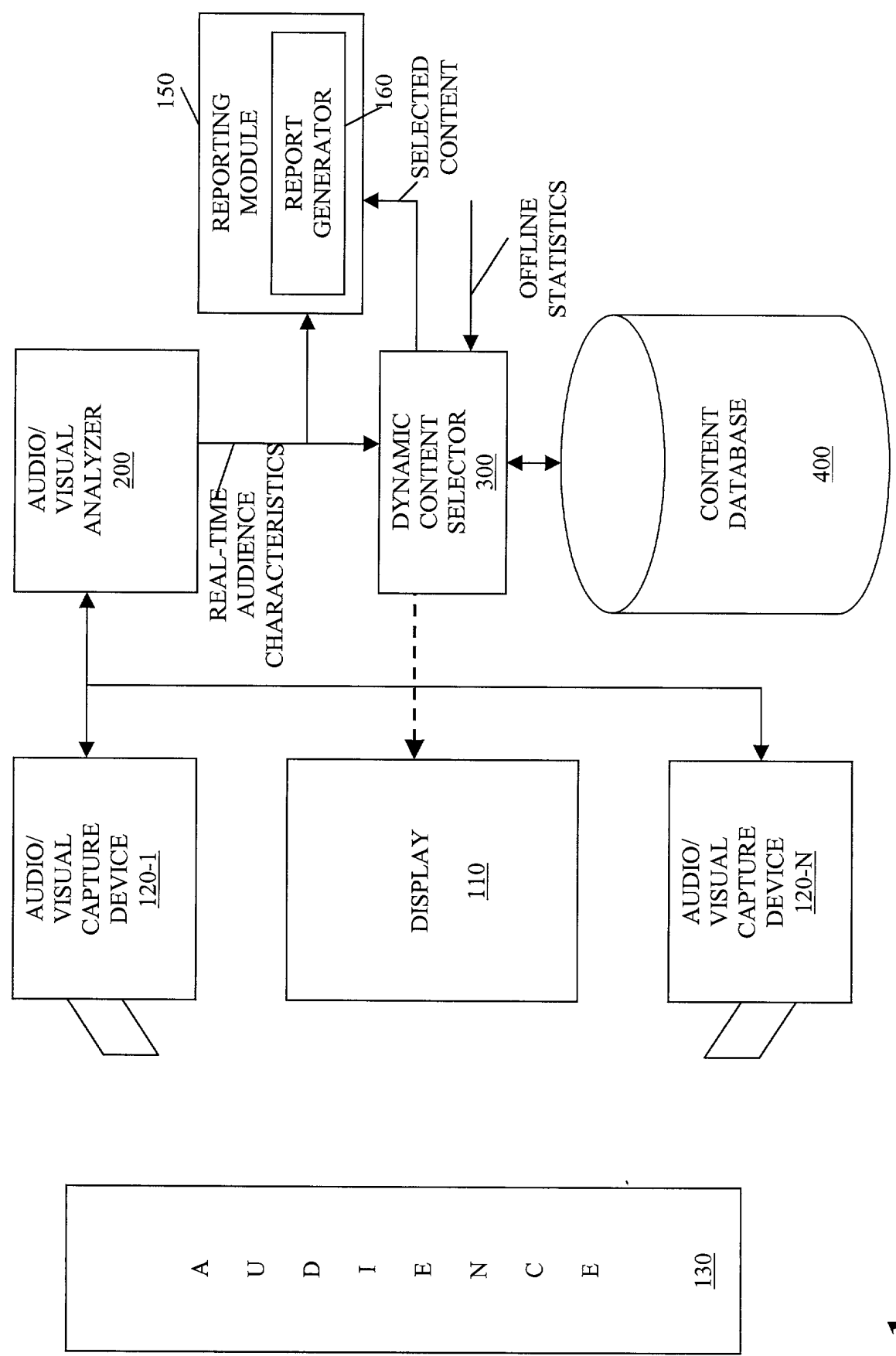


FIG. 1

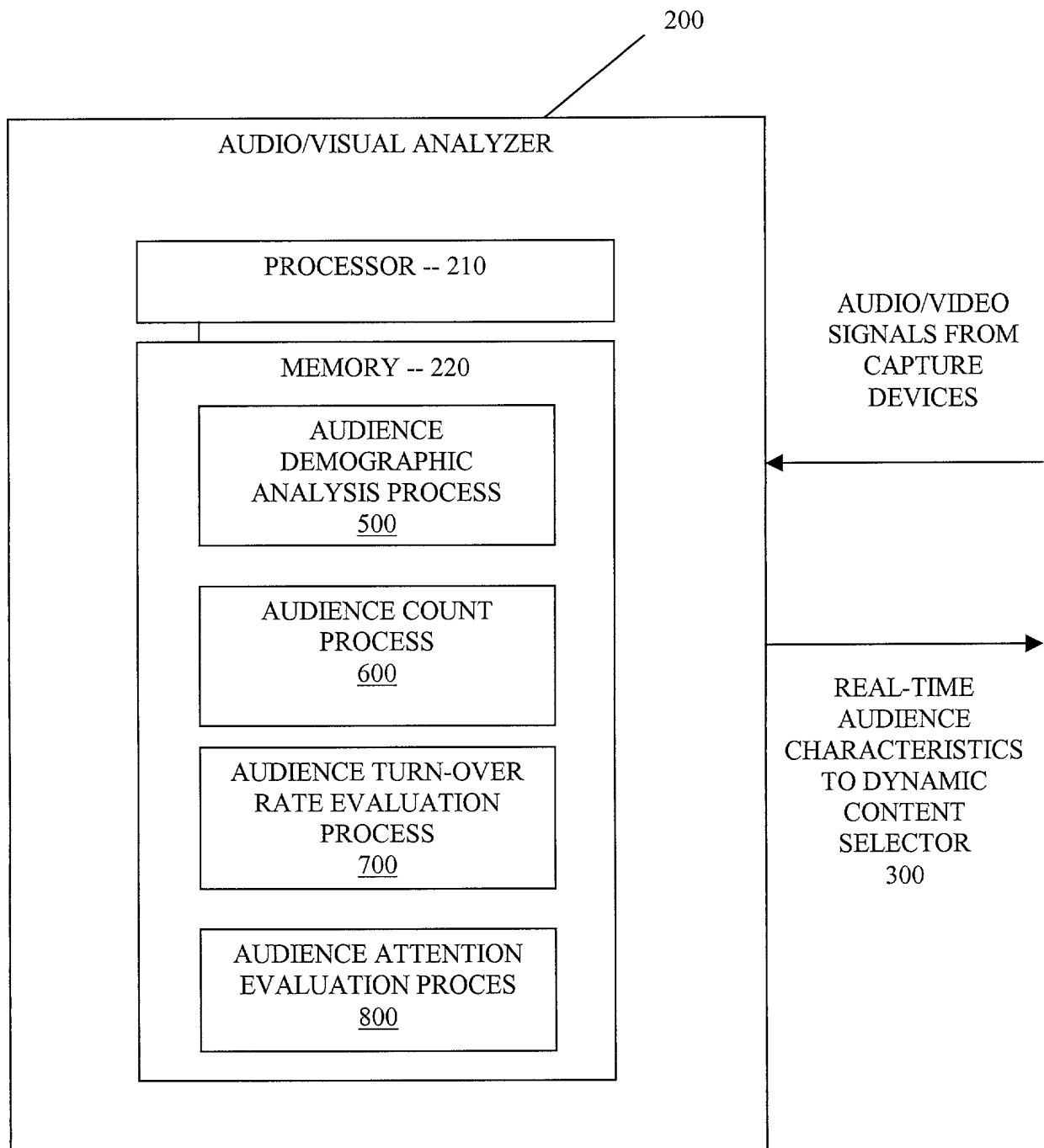


FIG. 2

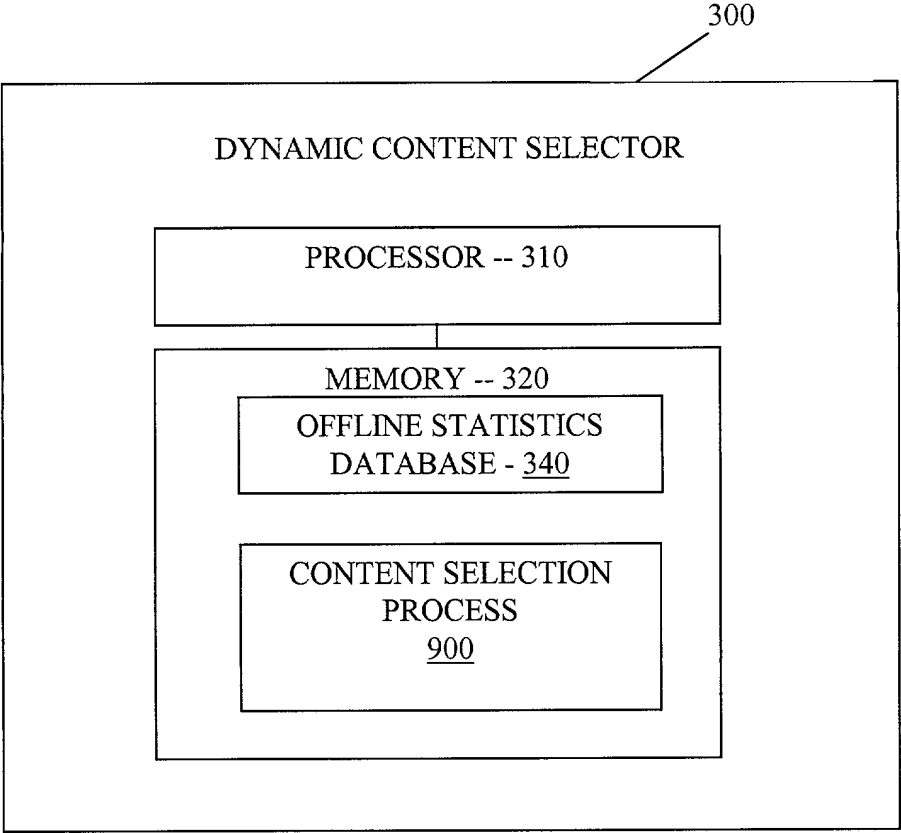


FIG. 3

CONTENT DATABASE -- 400

	CONTENT IDENTIFIER	BRIEF DESCRIPTION	TARGET AUDIENCE	LENGTH
	<u>430</u>	<u>440</u>	<u>450</u>	<u>460</u>
405	AD1	CANADIAN TOURISM BOARD AD	CANADIAN TOURISTS	5 MINUTES
410	NEWS2	SPORTS UPDATE	MEN	30 MINUTES
415	AD6	RESTAURANT ADVERTISEMENT	GENERAL	30 SECONDS
....				
420	AD5	TOY STORE AD	CHILDREN	1 MINUTE

FIG. 4

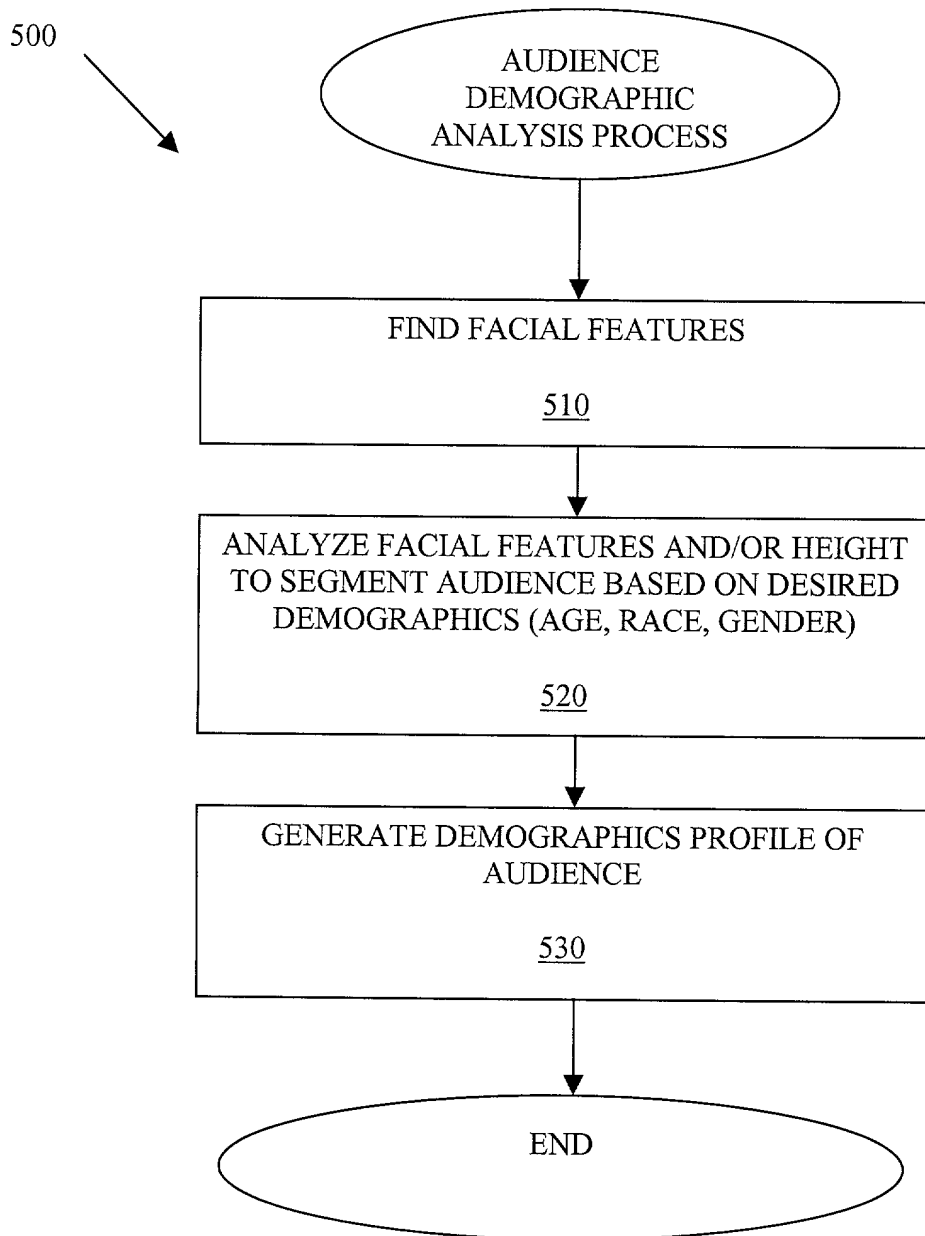
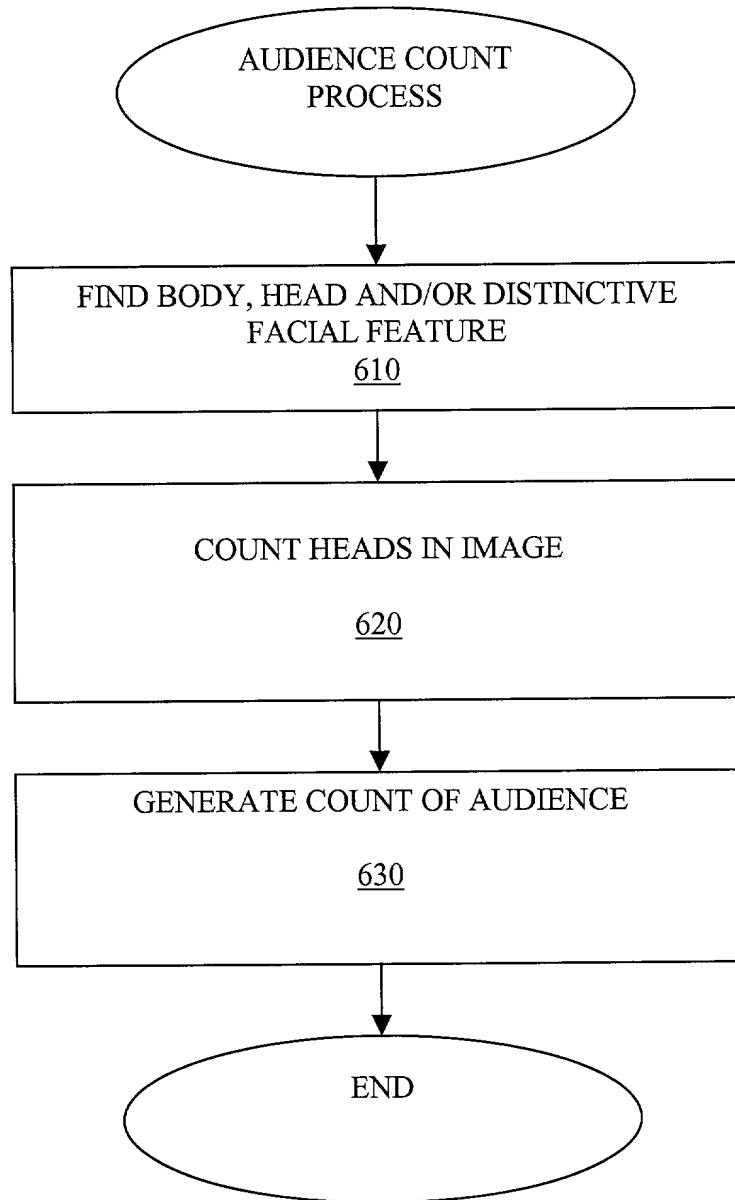
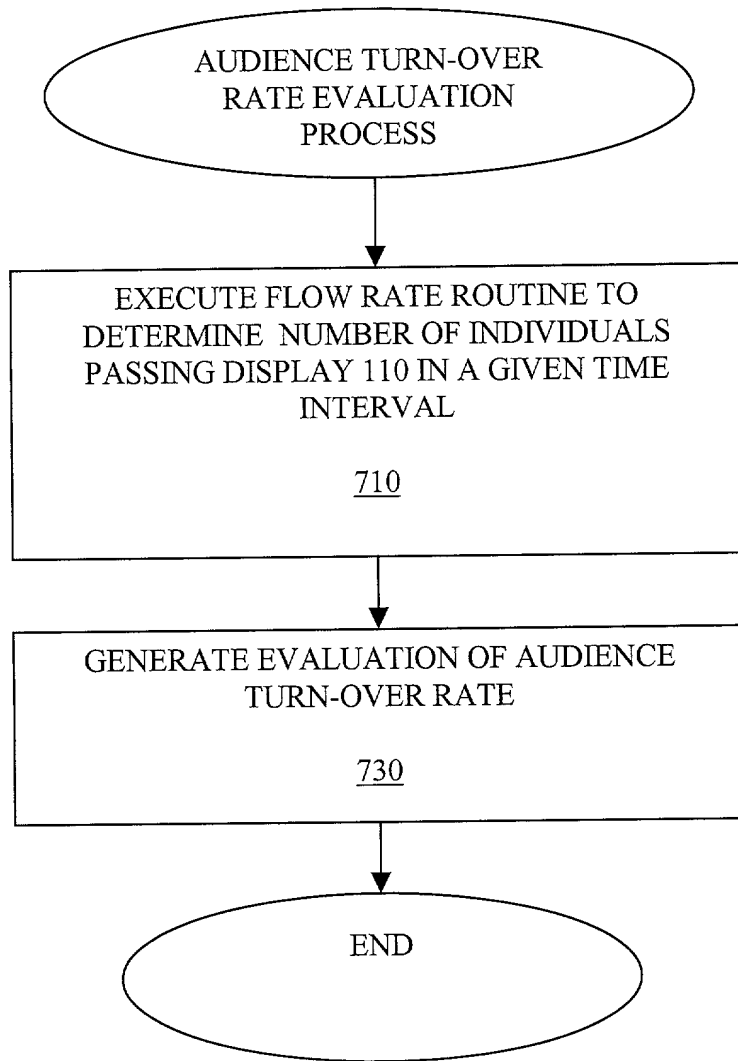
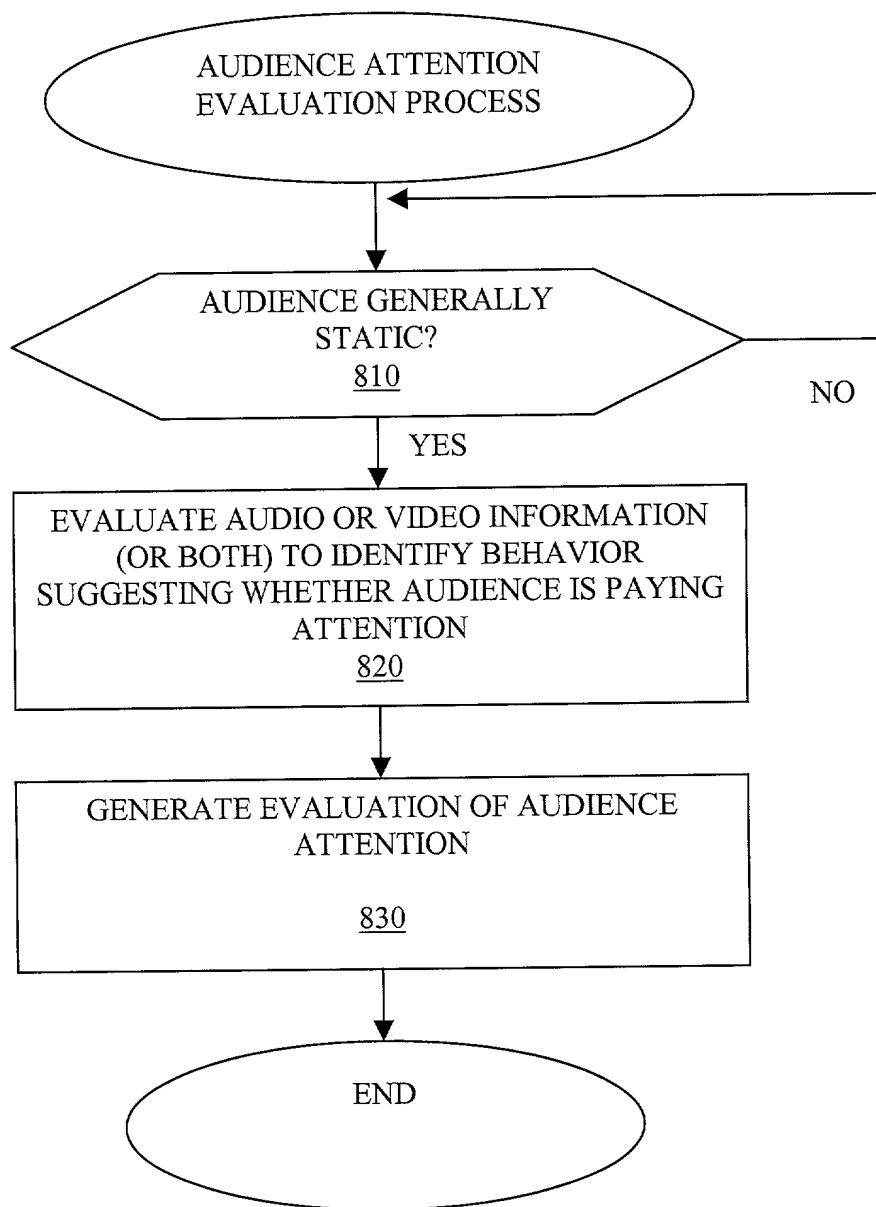


FIG. 5

**FIG. 6**

**FIG. 7**



**FIG. 8**

CONTENT SELECTION AND  
DRIVING PROCESS

RECEIVE AUDIENCE STATISTICS FROM A/V  
ANALYZER 200

910

DO STATISTICS SUGGEST  
AUDIENCE IS PRIMARILY  
COMPOSED OF A GIVEN  
SEGMENT?

920

NO

YES

DOES TURN-OVER  
RATE SUGGEST  
AUDIENCE  
COMPOSITION IS  
CHANGING SLOWLY?

940

YES

NO

SELECT AND DRIVE CONTENT  
APPROPRIATE FOR SEGMENT  
BASED ON TARGET  
AUDIENCE FIELD IN CONTENT  
DATABASE 400

930

SELECT AND DRIVE  
GENERAL CONTENT WITH  
AVERAGE DURATION FROM  
CONTENT DATABASE 400

960

SELECT AND DRIVE  
CONTENT HAVING A LONGER  
DURATION BASED ON  
LENGTH FIELD IN CONTENT  
DATABASE 400

950

END

**FIG. 9**

# CONTENT EVALUATION REPORT - 1000

Content: AD1

Content Provider: Canadian Tourism Board

		1051	1052	1053
		0 to T	T to 2T	2T to 3T
1005	Number of People in Audience	40		
1006	Number of People Arriving During Presentation	10		
1007	Number of People Leaving During Presentation	5		
1008	Turnover Rate			
1009	Percentage Male/Female			
1010	Percentage Adult/Children			
1011	Percentage Facing Display			
1012	Percentage Changing Facial Expression			
1013	Percentage Changing Body Posture			

**FIG. 10**

## DECLARATION and POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **Method and Apparatus for Tuning Content of Information Presented to an Audience** the specification of which (check one)

☒ is attached hereto.

\_\_\_\_\_ was filed on \_\_\_\_\_ as Application Serial No. \_\_\_\_\_ and was amended on \_\_\_\_\_

(if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by the amendment(s) referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulation, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

### PRIOR FOREIGN APPLICATION(S)

COUNTRY	APPLICATION NUMBER	DATE OF FILING (DAY, MONTH, YEAR)	PRIORITY CLAIMED UNDER 35 U.S.C. 119

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35 United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

### PRIOR UNITED STATES APPLICATION(S)

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (PATENTED, PENDING, ABANDONED)

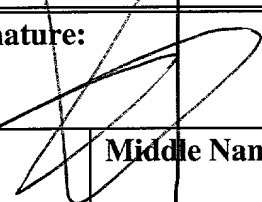
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

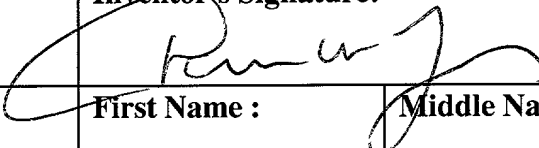
**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

Algy Tamoshunas, Reg. No. 27,677

Jack E. Haken, Reg. No. 26,902

SEND CORRESPONDENCE TO: Corporate Patent Counsel; U.S. Philips Corporation; 580 White Plains Road; Tarrytown, NY 10591	DIRECT TELEPHONE CALLS TO: Gregory L. Thorne (914) 333-9665
---	---

<b>Dated:</b> 6/22/00		<b>Inventor's Signature:</b> 		
<b>Full Name of Inventor</b>	<b>Last Name:</b> Cohen-Solal	<b>First Name :</b> Eric	<b>Middle Name:</b>	
<b>Residence &amp; Citizenship</b>	<b>City</b> Ossining	<b>State or Foreign Country</b> New York	<b>Country of Citizenship</b> France	
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<b>Dated:</b> 6/22/00		<b>Inventor's Signature:</b> 		
<b>Full Name of Inventor</b>	<b>Last Name:</b> Lyons	<b>First Name :</b> Damian	<b>Middle Name:</b> M.	
<b>Residence &amp; Citizenship</b>	<b>City</b> Putnam Valley	<b>State or Foreign Country</b> New York	<b>Country of Citizenship</b> United States of America	
<b>Post Office Address</b>	<b>Street</b> 12 Butterfly Lane	<b>City</b> Putnam Valley	<b>State or Country</b> New York	<b>Zip Code</b> 10579

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of  
ERIC COHEN-SOLAL ET AL

Atty. Docket  
US000149

Serial No.

Filed: CONCURRENTLY

Title: METHOD AND APPARATUS FOR TUNING CONTENT OF INFORMATION  
PRESENTED TO AN AUDIENCE

Commissioner of Patents and Trademarks  
Washington, D.C. 20231

APPOINTMENT OF ASSOCIATES

Sir:

The undersigned Attorney of Record hereby revokes all prior appointments (if any) of Associate Attorney(s) or Agent(s) in the above-captioned case and appoints:

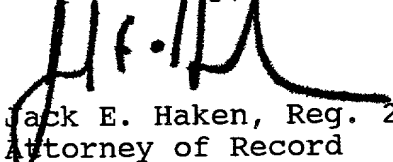
**GREGORY L. THORNE**

**(Registration No. 39,398)**

c/o U.S. PHILIPS CORPORATION, Intellectual Property Department, 580 White Plains Road, Tarrytown, New York 10591, his Associate Attorney(s)/Agent(s) with all the usual powers to prosecute the above-identified application and any division or continuation thereof, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

ALL CORRESPONDENCE CONCERNING THIS APPLICATION AND THE LETTERS PATENT WHEN GRANTED SHOULD BE ADDRESSED TO THE UNDERSIGNED ATTORNEY OF RECORD.

Respectfully,

  
Jack E. Haken, Reg. 26,902  
Attorney of Record

Dated at Tarrytown, New York  
this 26<sup>th</sup> day of June, 2000.